Isolated congenital asplenia

Isolated congenital asplenia is a condition in which affected individuals are missing their spleen (asplenia) and have no other developmental abnormalities. While most individuals with this condition have no spleen at all, some people have a very small, nonfunctional spleen (hyposplenism).

The spleen plays an important role in the immune system. This organ is part of the lymphatic system, which produces and transports fluids and immune cells throughout the body. The spleen produces certain immune system cells called phagocytes that help remove bacteria from the blood in order to prevent infections. The spleen also stores particular blood cells that fight foreign invaders until they are needed and filters old blood cells for removal. Because people with isolated congenital asplenia lack these immune functions, they are highly susceptible to bacterial infections.

People with isolated congenital asplenia are prone to developing severe, recurrent infections. Infections most commonly affect the whole body (sepsis), the membrane covering the brain and spinal cord (meningitis), or the ears (otitis media). Infections are most often caused by the *Streptococcus pneumoniae* bacteria.

Without preventative care and proper treatment, the frequent infections caused by isolated congenital asplenia can be life-threatening.

Frequency

The worldwide prevalence of isolated congenital asplenia is unknown. One population study done in France estimated that the condition occurs in 1 per 2 million newborns.

Causes

About 40 percent of cases of isolated congenital asplenia are caused by mutations in a gene called *RPSA*. This gene provides instructions for making a protein called ribosomal protein SA, which is one piece of cellular structures called ribosomes. Ribosomes process the cell's genetic instructions to create proteins.

Each ribosome has two parts (subunits) called the large and small subunits. Ribosomal protein SA is one of several proteins that make up the small subunit. Within the ribosome, the function of the ribosomal protein SA is unclear. Research suggests that it helps the ribosome control the production of certain proteins, many of which are likely important for development before birth.

RPSA gene mutations are thought to reduce the amount of functional ribosomal protein SA. A shortage of the normal protein likely impairs the assembly of ribosomes, but the specific effects of the mutations are not known. It is unclear why *RPSA* gene mutations appear to solely affect development of the spleen.

When isolated congenital asplenia is not caused by mutations in the *RPSA* gene, the cause of the condition is unknown.

Inheritance Pattern

Isolated congenital asplenia caused by mutations in the *RPSA* gene is inherited in an autosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to cause the disorder.

In most cases, an affected person inherits the mutation from one affected parent. Other cases result from new mutations in the gene that occur during the formation of reproductive cells (eggs or sperm) in an affected individual's parent or in early embryonic development. These cases occur in people with no history of the disorder in their family.

For unknown reasons, some people with an *RPSA* gene mutation that has been associated with isolated congenital asplenia have a normal spleen. The condition is said to have incomplete penetrance because not everyone with an *RPSA* gene mutation develops the condition.

When the cause of isolated congenital asplenia is unknown, the inheritance of the condition is unclear.

Other Names for This Condition

- asplenia, familial
- asplenia, isolated congenital
- congenital hypoplasia of spleen
- hypoplasia of spleen
- hyposplenia, isolated congenital
- ICAS
- spenlic hypoplasia

Diagnosis & Management

Formal Treatment/Management Guidelines

- Canadian Immunization Guide: Immunization of Persons with Chronic Diseases: Asplenia or Hyposplenia https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-3-vaccination-specific-populations/page-7-immunization-persons-with-chronic-diseases.html#p3c6a2
- Centers for Disease Control and Prevention: Asplenia and Adult Vaccination https://www.cdc.gov/vaccines/adults/rec-vac/health-conditions/asplenia.html

- Davies JM, Lewis MP, Wimperis J, Rafi I, Ladhani S, Bolton-Maggs PH; British Committee for Standards in Haematology. Review of guidelines for the prevention and treatment of infection in patients with an absent or dysfunctional spleen: prepared on behalf of the British Committee for Standards in Haematology by a working party of the Haemato-Oncology task force. Br J Haematol. 2011 Nov; 155(3):308-17. doi: 10.1111/j.1365-2141.2011.08843.x. Review.
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  https://pch.health.wa.gov.au/For-health-professionals/Clinical-Practice-Guidelines/Asplenia-and-hyposplenia-vaccination-and-prophylaxis
- Salvadori MI, Price VE; Canadian Paediatric Society, Infectious Diseases and Immunization Committee. Preventing and treating infections in children with asplenia or hyposplenia. Paediatr Child Health. 2014 May;19(5):271-8. English, French.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/24855431
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4029242/

Genetic Testing Information

- What is genetic testing?
  /primer/testing/genetictesting
- Genetic Testing Registry: Asplenia, isolated congenital
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C0685889/

Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?cond=%22isolated+congenital+asplenia%22+OR+%22absent+spleen%22+OR+%22asplenia%22

Other Diagnosis and Management Resources

- MedlinePlus Encyclopedia: Abdominal MRI Scan
  https://medlineplus.gov/ency/article/003796.htm

Additional Information & Resources

Health Information from MedlinePlus

- Encyclopedia: Abdominal MRI Scan
  https://medlineplus.gov/ency/article/003796.htm
- Encyclopedia: Immunodeficiency Disorders
  https://medlineplus.gov/ency/article/000818.htm

- Health Topic: Bacterial Infections
  https://medlineplus.gov/bacterialinfections.html
- Health Topic: Immune System and Disorders
  https://medlineplus.gov/immunesystemanddisorders.html
- Health Topic: Spleen Diseases
  https://medlineplus.gov/spleendiseases.html

Educational Resources

- Children's Hospital of Pittsburgh: What Does the Spleen Do?
  http://www.chp.edu/our-services/transplant/liver/education/organs/spleen-information
- MalaCards: asplenia, isolated congenital
  https://www.malacards.org/card/asplenia_isolated_congenital
- Merck Manual Consumer Version: Overview of the Spleen
  https://www.merckmanuals.com/home/blood-disorders/spleen-disorders/overview-of-the-spleen
- Orphanet: Familial isolated congenital asplenia
  https://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=101351

Patient Support and Advocacy Resources

- Immune Deficiency Foundation
  https://primaryimmune.org/
- Jeffrey Modell Foundation
  http://www.info4pi.org/

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28isolated+congenital+asplenia%5BTIAB%5D%29+OR+%28congenital+asplenia%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

Catalog of Genes and Diseases from OMIM

- ASPLENIA, ISOLATED CONGENITAL
  http://omim.org/entry/271400

Medical Genetics Database from MedGen

- Familial isolated congenital asplenia
  https://www.ncbi.nlm.nih.gov/medgen/799705

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